Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

What is claimed is:

Claims 1-38 (Cancelled).

Claim 39 (Original): Fluid flow contouring apparatus for preferentially contouring the fluid path of a process fluid flowing cross-wise across and contacting a plurality of spaced-apart heat transfer conduits, said apparatus comprising a plurality of longitudinally continuous, sleeve-shaped baffle structures, each baffle structure comprising at least a paired set of fluid flow apertures which constitute the only upstream-to-downstream fluid passage through the fluid flow contouring apparatus, each of said baffle structures substantially symmetrically surrounding a heat transfer conduit to define an annular-shaped fluid flow region thereby isolating cross-wise fluid flow around that associated heat transfer conduit from cross-wise fluid flow around adjacent heat transfer conduits located transversely to the direction of fluid flow, and wherein the fluid flow apertures of a baffle structure are symmetrically located respectively upstream and downstream of the associated heat transfer conduit in at least partial upstream and downstream alignment with each other and with the associated heat transfer conduit, whereby each said baffle structure contours the flow path of said process fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat transfer conduit.

Claim 40 (Original): Fluid flow contouring apparatus according to claim 39 wherein said heat transfer conduits comprise an array of cylindrical heat transfer conduits oriented to have parallel axes.

Claim 41 (Original): Fluid flow contouring apparatus according to claim 40 wherein each said baffle structure comprises a sleeve-shaped element which is substantially concentric relative to the associated heat transfer conduit.

Claim 42 (Original): Fluid flow contouring apparatus according to claim 41 wherein said paired sets of fluid flow apertures comprise upstream and downstream apertures in said sleeve-shaped elements.

Claim 43 (Original): Fluid flow contouring apparatus according to claim 39 wherein at least two of said baffle structures are interconnected into a larger flow contouring apparatus for contouring fluid flow around a plurality of heat transfer conduits.

Claim 44 (Original): Fluid flow contouring apparatus according to claim 40 wherein said heat transfer conduits are arranged in a generally circular array.

Claim 45 (Original): Fluid flow contouring apparatus according to claim 44 wherein the individual baffle structures associated with the heat transfer conduits are interconnected to form a larger, cylindrical-shaped flow contouring apparatus.

Claim 46 (Original): Fluid flow contouring apparatus according to claim 45 wherein pairs of fluid flow apertures comprise radially-aligned upstream and downstream apertures in the individual baffle structures.

Claim 47 (Original): Fluid flow controuring apparatus according to claim 45 wherein pairs of fluid flow apertures comprise upstream and downstream apertures in the individual baffle structures which are offset from the radial line.

Claim 48 (Original): Fluid flow contouring apparatus according to claim 39 wherein said heat transfer conduits comprise at least one generally circular array of axially aligned cylindrical heat transfer conduits, at least some of which are substantially surrounded by a substantially concentric apertured sleeve-shaped structure having upstream and downstream aperture pairs in columns parallel to the axis of the associated conduit, further wherein a sleeve-shaped structure is secured by a plate member to an adjacent sleeve-shaped structure to form a larger cylindrical structure.

Claim 49 (Original): Fluid flow contouring apparatus according to claim 48 wherein the aperture pairs comprise elongated slots, each slot having a long axis generally parallel to the axes of the heat transfer conduits.

Claim 50 (Original): Fluid flow contouring apparatus according to claim 49 wherein pairs of elongated slots are in radial alignment.

Claim 51 (Original): Fluid flow contouring apparatus according to claim 49 wherein a heat transfer conduit is associated with two pairs of elongated slots, each slot pair being offset from radial alignment with the axis of the larger cylindrical structure.

Claim 52 (Original): Fluid flow contouring apparatus according to claim 51 wherein the two upstream and the two downstream elongated slots associated with each heat transfer conduit are axially offset from one another but axially aligned with the opposite pair member.

Claim 53 (Original): Fluid flow contouring apparatus according to claim 48 wherein said heat transfer conduits comprise at least two generally circular arrays of cylindrical heat transfer conduits oriented to have parallel axes, one array being concentric relative to the other.

Claim 54 (Original): Fluid flow contouring apparatus according to claim 53 wherein the aperture pairs comprise elongated slots in radial alignment, each slot having a long axis generally parallel to the axes of the heat transfer conduits.

Claim 55 (Original): Fluid flow contouring apparatus according to claim 53 wherein the baffle structures of adjacent pairs of radially-aligned heat transfer conduits are interconnected such that an aperture between the baffle structures serves as the downstream fluid flow aperture for one of the conduits and the upstream fluid flow aperture for the other.

Claim 56 (Original): Fluid flow contouring apparatus according to claim 55 wherein the aperture pairs comprise elongated slots in radial alignment, each slot having a long axis generally parallel to the axes of the heat transfer conduits.

Claim 57 (currently amended): Fluid flow contouring apparatus for preferentially contouring the fluid path of a process fluid flowing cross-wise across and contacting a plurality of spaced-apart heat transfer conduits, said apparatus comprising a plurality of longitudinally continuous, sleeve-shaped baffle structures, each baffle structure comprising at least a paired set of fluid flow apertures which constitute the only upstream-to-downstream fluid passage through the fluid flow contouring apparatus, each of said baffle structures substantially symmetrically surrounding a heat transfer conduit to define an annular-shaped fluid flow region thereby isolating cross-wise fluid flow around that associated heat transfer conduit from cross-wise fluid flow around adjacent heat transfer conduits located transversely to the direction of fluid flow, and wherein the fluid flow apertures of a baffle structure are symmetrically located respectively upstream and downstream of the associated heat transfer conduit in at least partial upstream and downstream alignment with each other and with the associated heat transfer conduit, whereby each said baffle structure contours the flow path of said process fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat transfer conduit, further ~~Fluid flow contouring apparatus according to claim 39~~ wherein said heat transfer conduits comprise a substantially rectangular array comprising at least three axially aligned rows of cylindrical heat transfer conduits oriented to have parallel axes, and wherein the associated baffle structures comprise generally concentric sleeve-shaped elements having upstream and downstream aperture pairs.

Claim 58 (currently amended): Fluid flow contouring apparatus for preferentially contouring the fluid path of a process fluid flowing cross-wise across and contacting a plurality of spaced-apart heat transfer conduits, said apparatus comprising a plurality of longitudinally continuous, sleeve-shaped baffle structures, each baffle structure comprising at least a paired set of fluid flow apertures which constitute the only upstream-to-downstream fluid passage through the fluid flow contouring apparatus, each of said baffle structures substantially symmetrically surrounding a

heat transfer conduit to define an annular-shaped fluid flow region thereby isolating cross-wise fluid flow around that associated heat transfer conduit from cross-wise fluid flow around adjacent heat transfer conduits located transversely to the direction of fluid flow, and wherein the fluid flow apertures of a baffle structure are symmetrically located respectively upstream and downstream of the associated heat transfer conduit in at least partial upstream and downstream alignment with each other and with the associated heat transfer conduit, whereby each said baffle structure contours the flow path of said process fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat transfer conduit, further ~~Fluid flow contouring apparatus according to claim 39~~ wherein said heat transfer conduits comprise a substantially rectangular array comprising at least three rows of cylindrical heat transfer conduits, with alternate rows being axially offset from adjacent upstream and downstream rows, the heat transfer conduits oriented to have parallel axes, and wherein the associated baffle structures comprise generally concentric sleeve-shaped elements having upstream and downstream aperture pairs.

Claim 59 (Withdrawn): Fluid flow contouring apparatus according to claim 39 wherein the baffle structure associated with a heat transfer conduit comprises a set of substantially flat plate members positioned in pairs edgewise alongside two sides of a heat transfer surface in proximity to without touching the surface, the planes of said plate members being oriented generally orthogonal to the fluid path of the process fluid, so as to define generally annular-shaped fluid flow regions having upstream and downstream aperture pairs around said heat transfer conduits.

Claim 60 (Original): Fluid flow contouring apparatus according to claim 39 wherein the baffle structure associated with a heat transfer conduit comprises contoured plate members positioned in pairs alongside two sides of the heat transfer conduit in proximity to without touching the surface of the conduit, said plate members having a contour corresponding respectively to the two sides of the heat transfer conduit so as to define generally annular-shaped fluid flow regions having upstream and downstream openings around said heat transfer conduits, said plate members being joined to other plate members associated with adjacent heat transfer conduits.

Claim 61 (Original): A method for enhancing heat transfer to or from a fluid flowing cross-wise in contact with the outer surfaces of a plurality of heat exchange conduits comprising the step of preferentially contouring cross-wise fluid flow across the heat exchange conduits by flowing the fluid through at least a paired set of fluid flow constrictors in a longitudinally continuous, sleeve-shaped baffle structure associated with a heat exchange conduit, said baffle structure being part of an array of such baffle structures, each of which substantially symmetrically surrounds its associated heat exchange conduit to isolate cross-wise fluid flow around that associated heat exchange conduit from cross-wise fluid flow around adjacent heat exchange conduits located transversely to the direction of fluid flow, wherein the fluid flow constrictors of each baffle structure constitute the only upstream-to-downstream fluid passage through the baffle structure array and are symmetrically located respectively upstream and downstream of the associated heat exchange surface in at least partial upstream and downstream alignment with each other and with the associated heat exchange conduit, and whereby each baffle structure contours the flow path of said fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat exchange conduit.

Claim 62 (Original): A method according to claim 61 wherein said heat exchange conduits comprise an array of cylindrical heat exchange conduits oriented to have parallel axes.

Claim 63 (Original): A method according to claim 62 wherein each said baffle structure comprises a sleeve-shaped element which is substantially concentric relative to the associated heat exchange conduit.

Claim 64 (Original): A method according to claim 63 wherein said paired sets of fluid flow constrictors comprise upstream and downstream apertures in said sleeve-shaped elements.

Claim 65 (Original): A method according to claim 61 wherein at least two of said baffle structures are interconnected into a larger flow contouring apparatus for contouring fluid flow around a plurality of heat exchange conduits.

Claim 66 (Original): A method according to claim 63 wherein said heat exchange conduits are arranged in a generally circular array.

Claim 67 (Original): A method according to claim 66 wherein the individual baffle structures associated with the heat exchange conduits are interconnected to form a larger, cylindrical-shaped flow contouring apparatus.

Claim 68 (Original): A method according to claim 67 wherein pairs of fluid flow constrictors comprise radially-aligned upstream and downstream apertures in the individual baffle structures.

Claim 69 (Original): A method according to claim 67 wherein pairs of fluid flow constrictors comprise upstream and downstream apertures in the individual baffle structures which are offset from the radial line.

Claim 70 (Original): A method according to claim 61 wherein said heat exchange conduits comprise at least one generally circular array of axially aligned cylindrical heat exchange conduits, at least some of which are substantially surrounded by a substantially concentric apertured sleeve-shaped structure having upstream and downstream aperture pairs in columns parallel to the axis of the associated conduit, further wherein a sleeve-shaped structure is secured by a plate member to an adjacent sleeve-shaped structure to form a larger cylindrical structure.

Claim 71 (Original): A method according to claim 70 wherein the aperture pairs comprise elongated slots, each slot having a long axis generally parallel to the axes of the heat exchange conduits.

Claim 72 (Original): A method according to claim 71 wherein pairs of elongated slots are in radial alignment.

Claim 73 (Original): A method according to claim 71 wherein a heat exchange conduit is associated with two pairs of elongated slots, each slot pair being offset from radial alignment with the axis of the larger cylindrical structure.

Claim 74 (Original): A method according to claim 73 wherein the two upstream and the two downstream elongated slots associated with each heat exchange conduit are axially offset from one another but axially aligned with the opposite pair member.

Claim 75 (Original): A method according to claim 70 wherein said heat exchange conduits comprise at least two generally circular arrays of cylindrical heat exchange conduits oriented to have parallel axes, one array being concentric relative to the other.

Claim 76 (Original): A method according to claim 75 wherein the aperture pairs comprise elongated slots in radial alignment, each slot having a long axis generally parallel to the axes of the heat exchange conduits.

Claim 77 (Original): A method according to claim 75 wherein the baffle structures of adjacent pairs of radially-aligned heat exchange conduits are interconnected such that an aperture between the baffle structures serves as the downstream fluid flow constrictor for one of the conduits and the upstream fluid flow constrictor for the other.

Claim 78 (Original): A method according to claim 77 wherein the aperture pairs comprise elongated slots in radial alignment, each slot having a long axis generally parallel to the axes of the heat exchange conduits.

Claim 79 (currently amended): <u>A method for enhancing heat transfer to or from a fluid flowing cross-wise in contact with the outer surfaces of a plurality of heat exchange conduits comprising the step of preferentially contouring cross-wise fluid flow across the heat exchange conduits by flowing the fluid through at least a paired set of fluid flow constrictors in a longitudinally continuous, sleeve-shaped baffle structure associated with a heat exchange conduit, said baffle structure being part of an array of such baffle structures, each of which substantially</u>

symmetrically surrounds its associated heat exchange conduit to isolate cross-wise fluid flow around that associated heat exchange conduit from cross-wise fluid flow around adjacent heat exchange conduits located transversely to the direction of fluid flow, wherein the fluid flow constrictors of each baffle structure constitute the only upstream-to-downstream fluid passage through the baffle structure array and are symmetrically located respectively upstream and downstream of the associated heat exchange surface in at least partial upstream and downstream alignment with each other and with the associated heat exchange conduit, and whereby each baffle structure contours the flow path of said fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat exchange conduit, further ~~A method according to claim 61~~ wherein said heat exchange conduits comprise a substantially rectangular array comprising at least three axially aligned rows of cylindrical heat exchange conduits oriented to have parallel axes, and wherein the associated baffle structures comprise generally concentric sleeve-shaped elements having upstream and downstream aperture pairs.

Claim 80 (currently amended): A method for enhancing heat transfer to or from a fluid flowing cross-wise in contact with the outer surfaces of a plurality of heat exchange conduits comprising the step of preferentially contouring cross-wise fluid flow across the heat exchange conduits by flowing the fluid through at least a paired set of fluid flow constrictors in a longitudinally continuous, sleeve-shaped baffle structure associated with a heat exchange conduit, said baffle structure being part of an array of such baffle structures, each of which substantially symmetrically surrounds its associated heat exchange conduit to isolate cross-wise fluid flow around that associated heat exchange conduit from cross-wise fluid flow around adjacent heat exchange conduits located transversely to the direction of fluid flow, wherein the fluid flow constrictors of each baffle structure constitute the only upstream-to-downstream fluid passage through the baffle structure array and are symmetrically located respectively upstream and downstream of the associated heat exchange surface in at least partial upstream and downstream alignment with each other and with the associated heat exchange conduit, and whereby each baffle structure contours the flow path of said fluid to establish a substantially uniform fluid flow pattern around the contour of the associated heat exchange conduit, and wherein said heat exchange conduits comprise an array of cylindrical heat exchange conduits oriented to have

parallel axes and which comprises ~~A method according to claim 62 wherein said heat exchange conduits comprise~~ a substantially rectangular array comprising at least three rows of cylindrical heat exchange conduits, with alternate rows being axially offset from adjacent upstream and downstream rows, the heat exchange conduits oriented to have parallel axes, and wherein the associated baffle structures comprise generally concentric sleeve-shaped elements having upstream and downstream aperture pairs.

Claim 81 (withdrawn): A method according to claim 61 wherein the baffle structure associated with a heat exchange conduit comprises a set of substantially flat plate members positioned in pairs edgewise alongside two sides of a heat exchange conduit in proximity to without touching the surface, the planes of said plate members being oriented generally orthogonal to the fluid path of the process fluid, so as to define generally annular-shaped fluid flow regions having upstream and downstream aperture pairs around said heat exchange conduits.

Claim 82 (Original): A method according to claim 61 wherein the baffle structure associated with a heat exchange conduit comprises contoured plate members positioned in pairs alongside two sides of the heat exchange conduit in proximity to without touching the surface, said plate members having a contour corresponding respectively to the two sides of the heat exchange conduit so as to define generally annular-shaped fluid flow regions having upstream and downstream openings around said heat exchange conduits, said plate members being joined to other plate members associated with adjacent heat exchange conduits.

Reconsideration of the present application and allowance of claims 39-58, 60-80 and 82 is respectfully requested in view of the foregoing amendments and the following remarks.

Applicants thank the Examiner for pointing out that allowable subject matter is present in claims 57, 58, 79 and 80 of the present application. In order to expedite the allowance of claims, Applicants have amended those claims by rewriting them in independent form including all of the limitations of the base claim and any intervening claims.

In the Office Action, the Examiner rejected claim 39 under 35 U.S.C. 102(b) as being anticipated by Ruhe et al., United States Patent No. 3,1916,990 ("Ruhe" or "the '990 reference"). The Examiner cites Ruhe as disclosing a gas turbine regenerator that comprises a plurality of longitudinally continuous, sleeve-shaped baffle structures. Applicants submit, however, that Ruhe merely relates to a heat exchanger for effecting a heat exchange between two fluids flowing in counter-flow relation, (col. 1, lines 10-13), whereas the present claimed invention refers to a device that effects a heat exchange between two fluids flowing in a cross-flow relationship. Moreover, Applicants respectfully urge that Ruhe does not teach the claimed invention, but instead teaches a plurality of annular <u>support</u> units, comprising metal strips, disposed at spaced intervals throughout the length of the tubes, designed and placed therein to provide physical support for the tubes. Col. 3, lines 44-47; col. 4, lines 21-24 and col. 4, lines 36-41. Ruhe, however, does not disclose longitudinally continuous, sleeve shaped baffle structures, as called for in the present invention. The '990 reference, including figure 1, discloses that the structure relied on by the Examiner is actually a series of discrete annular bracket <u>support</u> structures, which are not longitudinally continuous, as recited and claimed in the present invention. Moreover, the grid pattern created by the brackets comprises curved sides defining a plurality of openings for receiving the tubes. The <u>remaining openings defined by the grid pattern</u> provide a free flow area for the gasses passing through the housing with a minimum of resistance. Col. 3, lines 48-61. In this regard, Ruhe fails to disclose the claimed paired set of fluid flow apertures that constitute the only upstream to downstream fluid passage. More specifically, Ruhe provides no disclosure of any apertures at all, let alone a paired set of apertures as described and claimed in the present invention. In addition, the annular pipe support

of Ruhe does not define an annular shaped fluid flow region - the fluid flow region in Ruhe is located outside the openings for receiving the tubes, flowing around the support structure, not the conduit. Moreover, Ruhe does not disclose cross-wise fluid flow around the associated heat transfer conduit from cross-wise fluid flow around adjacent heat transfer conduits located transversely to the direction of fluid flow. More specifically, there is no teaching at all of any cross-wise fluid flow, and based on the cited disclosure, it appears that gas flow in Ruhe is designed to be substantially parallel to the conduits over the entire length of the housing. Just as important, Ruhe does not disclosure a baffle structure that contours the flow path of the process fluid. Ruhe, in fact, specifically discloses a **free flow** area for the gasses passing through the housing with a minimum of resistance. Col. 3, lines 58-61. The free flow area of Ruhe is designed to produce a minimum of resistance along a flow path parallel to the conduit (not around the contour of the conduit) and, accordingly, is entirely different from the fluid flow contouring apparatus for preferentially contouring the fluid path of a process fluid flowing cross-wise across and contacting a heat transfer conduits, as claimed in the present invention.

In light of the above, reconsideration for this basis of rejection is respectfully requested.

With regard to claim 40, that claim is dependent upon claim 39 and therefore incorporates all of the novel features and elements of claim 39 that distinguish claim 39 over the cited prior art, as discussed above. In light of the features and elements of claim 39, discussed above, that are distinct from, and/or not disclosed at all in, Ruhe, Applicants respectfully submit that the cited reference does not anticipate dependent claim 40, and therefore cannot form a proper basis for rejection under 35 U.S.C 102 (b).

In light of the above, reconsideration for this basis of rejection is respectfully requested.

With regard to claim 41, Applicants respectfully reiterate their position that Ruhe does not disclose an apparatus with a baffle structure at all, but rather a bracket support system for supporting the conduit pipes. In addition, with more particular regard to claim 41, it is a bracket support in Ruhe that is concentric to the associated heat transfer conduit. The area for the free flow of gas through the bracket structure in Ruhe is central to a portion of the bracket structure that is peripheral to, not concentric to, the conduit. In addition, claim 41 is dependent upon

claim 40, and for all the reasons discussed above, claim 41 therefore is distinct from, and is not anticipated by, the cited prior art reference.

In light of the above, reconsideration for this basis of rejection is respectfully requested.

Referring to claim 42, Applicants respectfully state Ruhe does not disclose apertures in the sleeve shaped elements, either upstream or downstream. The bracket structure of Ruhe is arranged to provide for the free flow of gas, which must essentially pass around the bracket structure elements. In this regard, Ruhe provides no disclosure of an aperture in a sleeve shaped element, as described and claimed in the present application. In addition, claim 42 is dependent upon claim 41, and for all the reasons discussed above, claim 42 therefore is distinct from, and is not anticipated by, the cited prior art reference.

In light of the above, reconsideration for this basis of rejection is respectfully requested.

With regard to claims 43-56 and 60, Applicants respectfully submit that these claims are dependent claims, and therefore incorporate the elements and features discussed above that distinguish the presently claim application over the cited prior art reference. While Applicants need not rely solely on the reasons stated above to distinguish claims 43-56 and 60 from the cited reference, based on those reasons alone, claims 43-56 and 60 are distinct from the cited prior art reference. Accordingly, Ruhe cannot properly form the basis for a rejection of these claims under 35 U.S.C. 102 (b)

In light of the above, reconsideration for this basis of rejection is respectfully requested.

With regard to claim 61, the Examiner recites Ruhe as disclosing an apparatus that comprises the steps of preferentially contouring cross-wise fluid flow across the heat exchange conduits by flowing the fluid through at least a paired set of fluid flow constrictors in a longitudinally continuous, sleeve-shaped baffle structure associated with a heat exchange conduit. Applicants respectfully disagree that the apparatus of Ruhe is capable of anticipating the method in claim 61 of the present invention. Moreover, Applicants respectfully submit that Ruhe does not disclose any steps, or even an apparatus, for contouring fluid flow, or more specifically any step, method or means for effecting cross-wise fluid flow. In addition, the support units of Ruhe, which are not a baffle structures, are to Applicants' understanding, a series of discrete structures that extend narrowly across the diameter of the housing to allow for the free flow of gas, and, moreover, are not interconnected. The only disclosure of gas flow in

Ruhe is inherently around the support structure (there are no baffles), not through an aperture, and is in a path parallel to the conduits, not in a cross-wise direction around the contour of conduit. While Applicants could discuss many other features of the present invention that are in addition to and/or entirely distinct from those disclosed in Ruhe, based on these reasons alone, Ruhe cannot be said to disclose every step of the methods claimed in the present invention. Accordingly, Ruhe cannot form the proper basis for a rejection under 35 U.S.C. 102 (b).

In light of the above, reconsideration for this basis of rejection is respectfully requested.

With regard to claims 62- 78 and 82, these claims are dependent claims and thereby incorporate all of the novel features, elements and steps of the method of claim 61. While Applicants need not rely solely on those elements, features and steps already discussed above to distinguish claims 62-78 and 82 from the cited reference, those features, elements and steps alone are additional to and/or distinct from the cited prior art reference. Accordingly, Ruhe cannot properly form the basis for a rejection of claims 62-78 and 82 under 35 U.S.C. 102 (b).

In light of the above, reconsideration for this basis of rejection is respectfully requested.

Based on the foregoing, Applicants respectfully request reconsideration and allowance.

Respectfully submitted,

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